DPD 6677-59

1 October 1959

MEMORANDUM FOR: Chief, Developments Branch, DPD

SUBJECT: C-130A Range Extension

REFERENCES:
A. DPD 6426-59
B. DPD 6506-59
C. DPD 6534-59
D. DPD 6549-59
E. DPD 6588-59
F. DPD 6652-59
G. [redacted]394 (IN 08277)
H. [redacted] 4030 (IN 08452)

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1. The following memorandum is a summation of the investigation to extend the range of the C-130A aircraft. It is not clear, however, what operational requirement should be used as the basis of the conclusions and recommendations. References B, C, and F recommend the use of external tanks to fulfill a range requirement of 3,000 nautical miles. References D and E state the operational requirement of 3,500 nautical miles range to satisfactorily complete the mission. These latter references further state the desire for internal tank installation rather than the external tank configuration.

2. Two (2) types of fuel tanks have been used in the C-130A cargo compartment for range extension: the Navy Benson tank with a capacity of 500 gallons and the Air Force B-52 drop tank with a capacity of 1,000 gallons. More than one tank can be used to increase the fuel capacity of the aircraft. External tanks can be fitted to the aircraft with 450 gallon capacities. The aircraft is limited to a two (2) tank configuration or a total of 900 additional gallons of fuel.

3. Based on the flight test evaluation of the internal B-52 tank installation by the Air Force Flight Test Center, Edwards Air Force Base, California, the following aircraft performance can be realized:

Maximum allowable gross weight	124,500 #
Limit load factor at max gross	2.5 g
Empty weight	61,000#
2/B-52 tanks plus cradle	2,600#
Normal internal fuel	33,400#
Additional fuel required	11,100#
Payload	16,400#
TOTAL	124,500#

This loading of 1720 gallons of fuel in the 2/1000 gallon tanks will permit the aircraft to fly 3,500 nautical miles at an altitude of 28,000 feet. Allowance is made for start, taxi, accelerate to climb speed, and 3,500 pounds of fuel reserve over destination. Three (3) engine ceiling, using maximum continuous power, is 19,000 feet.

For 20,000# payload, the following overload weight breakdown is submitted:

Empty weight	61,000#
2/B-52 tanks plus cradle	2,600#
Normal internal fuel	33,400#
Additional fuel required	12,800#
Payload	20,000#
TOTAL	129,800#

This overload condition, requiring 1,970 gallons of extra fuel, is for a range of 3,500 nautical miles at a constant cruise altitude of 26,000 feet. Three (3) engine ceiling at this weight is estimated at 17,000 feet. The standard fuel allowances are included for 1/2 hour loiter at sea level at destination.

All range figures quoted are given for the no wind condition.

4. Based on the performance figures quoted by the AFFTC and my interpretation of the operational requirement, the following conclusions are submitted:

a. The aircraft can be configured with internal tanks to provide for a no wind range mission of 3,500 nautical miles.

b. Under the stipulation of the maximum allowable gross weight of the aircraft, 16,400 pounds of payload can be carried. In order to carry 20,000 pounds of payload, the aircraft must be overloaded 5,300 pounds.

c. The range requirement of 3,000 nautical miles can be met with the two (2) 450 gallon external fuel tanks. This extra drag penalty need not be paid since one (1) B-52 tank or two (2) Benson tanks would provide more capability when installed in the cargo compartment.

d. A removable internal tank installation can be fabricated to provide for future long range mission capability consistent with operational requirements.

e. All tank configurations suggested have been flown and there is no requirement for continued research and/or development effort.

5. The following recommendations are submitted:

a. The external tank configuration be eliminated from consideration as a means of extending the range of the C-130A. The extra drag and possible security compromise offer no significant advantages over the internal tank installation.

b. A kit be fabricated of two (2) B-52 drop tanks or four (4) Benson tanks to provide for the required additional range. The kit should provide for single or multiple tank utilization as dictated by mission requirements.

c. The aircraft should not be flown at weights exceeding the allowable gross weight of 124,500 pounds.

d. The Air Force should be officially informed of any "go ahead" decision.

e. The kit fabrication and installation be administered as a joint Operations/Materiel program.

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